

REMARKS

The Office Action of August 17, 2006 has been reviewed and the Examiner's comments carefully considered. Claims 1-20 are pending in this application, and claims 1, 14, 15 and 17 are in independent form.

The Examiner is thanked for withdrawing the objection to claim 14 as being a substantial duplicate of claim 1. The Examiner has again rejected all of pending claims 1-20. In particular, claims 1, 2, 4, 6-8 and 14 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Ward patent in view of the Watanabe publication. Claims 9-12, 15 and 16 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Ward patent and the Watanabe publication, in further view of the Kanada publication. Claims 3 and 17-20 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Ward patent, the Watanabe publication, the Kanada publication, and in further view of the Yamaji patent. Further, claim 13 stands rejected under 35 U.S.C. § 103(a) as being obvious over the Ward patent and the Watanabe publication, in further view of EP '596. Finally, claim 5 stands rejected under 35 U.S.C. § 103(a) as being obvious over the Ward patent and the Watanabe publication, in further view of the Inoue patent and the Ogura patent. In view of the following remarks, Applicants respectfully request reconsideration of these rejections.

The Watanabe Publication

The Watanabe publication is directed to a structure and method of absorbing and shielding sound. In particular, and as discussed in the previous Amendment, the Watanabe publication describes structures and methods for absorbing and shielding sound for use "as a sound absorbing and shielding material of an automotive vehicle". Watanabe Publication, ¶ [0005]. Further, the Watanabe publication discloses a multi-layer sound absorbing and shielding structure, which consists of a first panel layer, a sound absorbing material layer, an air layer and a second panel layer, which are located in a sequence from a source of sound. As shown in Fig. 5 of the Watanabe publication, a vehicular body A includes a partition wall (a dash insulator) that includes these multiple panels and sound absorbing layers. Further, the sound absorbing material layer 3 may be composed of a multi-layered structure including multiple layers of different apparent densities. For example,

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 2800

Application. No. 10/730,162

Response dated October 2, 2006

Reply to Final Office Action of August 17, 2006

Attorney Docket No. 4444-032065

fibrous layers may be used, and the fibrous layers 12 of the second panel layer 6 can be formed of polyester fibers as the main components, due to the mechanical strength, processing efficiency and market circulation. In one embodiment, the polyester material may include polyethylene naphthalate (PEN). It is these various layers that make up the “sound absorbing and shielding” structure of the Watanabe publication.

Claims 1-20 of the Present Application Are Not Obvious in View of the Cited Art

The present invention is directed to a loudspeaker diaphragm. This diaphragm includes a base layer having a woven fabric of polyethylene naphthalate fibers impregnated with a thermosetting resin. In addition, the present invention is directed to a loudspeaker, which includes a loudspeaker diaphragm as discussed above, and also a method for manufacturing a loudspeaker diaphragm. The method of manufacturing the diaphragm includes the steps of: impregnating a woven fabric of polyethylene naphthalate fiber with a thermosetting resin and curing the thermosetting resin, so as to form a base layer; adding an active gas in a super critical state to a molten thermoplastic resin and extruding the mixture of the thermoplastic resin in the inactive gas at prescribed temperature and pressure, so as to form a thermoplastic resin layer; and laminating the base layer and the thermoplastic resin layer. In addition, the present invention is directed to a loudspeaker diaphragm including a base layer as the outermost layer, a thermoplastic resin layer and a thermoplastic elastomer layer, where the base layer has a woven fabric of polyethylene naphthalate fiber impregnated with a thermosetting resin.

The Examiner is thanked for responding to the arguments presented by Applicant in the Response to the previous Office Action. In the present Office Action, the Examiner has again asserted that the cited prior art does include suggestions to combine. Accordingly, the Examiner has combined: two references to reject claims 1, 2, 4, 6-8 and 14; three references to reject claims 9-12, 15 and 16; four references to reject claims 3 and 17-20; three references to reject claim 13; and four references to reject claim 5. Accordingly, the Examiner is using seven different references to pick and choose various components and teachings in order to reconstruct Applicant’s claimed invention. In addition, the Examiner has asserted that the Watanabe publication is analogous art, even though it is directed to sound absorbing and shielding structures in the field of automotive manufacturing.

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 2800

Application. No. 10/730,162

Response dated October 2, 2006

Reply to Final Office Action of August 17, 2006

Attorney Docket No. 4444-032065

Applicant again urges the Examiner to reconsider the rejections based upon the lack of motivation to combine the references and the use of non-analogous art. As the Examiner is aware, even if the cited prior art references teach each element of the claimed invention, without a motivation to combine, the obviousness rejections are improper. *In re Rouffet*, 149 F.3d 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998); MPEP § 2143.01. Further, the “level of skill in the art cannot be relied upon to provide the suggestion to combine the references.” MPEP § 2143.01. When there is no specific understanding within the knowledge of the skilled artisan, and when the secondary references lead away from the claimed invention, a case of obviousness cannot be established. *See In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). “It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983).” MPEP § 2145.

Further, with respect to the pertinence of the cited references, the Examiner is not permitted to use non-analogous art. MPEP § 2141. For example, in *In re Oetiker*, the Court overturned the Board’s finding that all “hooking problems” are analogous, finding that the specified reference was not within the field of applicant’s endeavor, and not reasonably pertinent to the particular problem. 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Accordingly, making broad assertions as to the field of endeavor or problems to be solved should be avoided.

Applicants respectfully point out to the Examiner that the Watanabe publication, and the systems and structures disclosed therein, are not in the same field of endeavor as the present invention. Further, there is absolutely no motivation to combine the teachings of the Watanabe publication with the remaining cited prior art in order to arrive at the claimed loudspeaker diaphragm. In short, the Watanabe publication only describes sound absorbing and shielding structures for automotive vehicles. Therefore, the Watanabe publication describes the use of polyethylene naphthalate fibers in a fibrous layer form to be used as a sound absorbing material. Accordingly, the Watanabe publication does not describe polyethylene naphthalate (PEN) fiber impregnated with a thermosetting resin to be used as a loudspeaker diaphragm. The PEN fiber impregnated with a thermosetting resin

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 2800

Application. No. 10/730,162

Response dated October 2, 2006

Reply to Final Office Action of August 17, 2006

Attorney Docket No. 4444-032065

provides a large effect for a loudspeaker diaphragm of the present invention. As specifically described in pages 23-24 of the specification of the present application, since a PEN woven fabric used in the present invention has an extremely large weave density, there exists a small amount of thermosetting resin as a binder resin between fibers constituting the woven fabric in the resultant diaphragm. As a result, a laminated structure having a woven fabric layer and a resin layer is substantially formed in the base layer, and such a structure contributes to further improvement of an internal loss. Therefore, there is a specific reason for using this PEN fiber impregnated with a thermosetting resin in manufacturing a loudspeaker diaphragm.

The Watanabe publication includes absolutely no motivation to combine or desirability to be combined with the Ward patent in order to arrive at the claimed loudspeaker diaphragm. In fact, the Watanabe publication is directed to sound absorbing and shielding structures for use in manufacturing dashboards and the like in a car, while the present invention is directed to a sound-producing structure, namely a loudspeaker diaphragm. Therefore, the nature, use and results of a loudspeaker diaphragm having a base layer of woven fabric of a PEN fiber impregnated with a thermosetting resin, is wholly different than and distinguishable from a sound absorbing and shielding layer manufactured from PEN fiber for use in dashboards and other components in an automotive vehicle. Simply, the fields are totally different, the skilled artisans would never look to the area of automotive dashboard construction when attempting to improve the internal loss problems associated with loudspeaker diaphragms.

Although the Examiner takes a position that both the Ward patent and the Watanabe publication teach the art of acoustics, and that there is motivation to combine, Applicants assert that the sound absorbing material in the Watanabe publication is clearly different from the loudspeaker diaphragm of the present invention in view of both structure and required properties. The mechanism of absorbing sound by the sound absorbing material is that a part of sound energy is converted into thermo energy by friction loss of air vibration with porous portions of sound absorbing material. Accordingly, the sound absorbing material should have porous portions in large thickness. On the other hand, a loudspeaker diaphragm is not manufactured from a sound absorbing material, but a sound generating material, as discussed above. The loudspeaker diaphragm should vibrate by itself. Therefore, the

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 2800

Application. No. 10/730,162

Response dated October 2, 2006

Reply to Final Office Action of August 17, 2006

Attorney Docket No. 4444-032065

loudspeaker diaphragm should be lightweight and have a very thin thickness. The material, having porous portions in large thickness, cannot be used as the loudspeaker diaphragm, and therefore, the sound absorbing material in the Watanabe publication is not applicable to the loudspeaker diaphragm of the present invention.

Accordingly, Applicants again assert that the Watanabe publication is non-analogous art, and has no bearing upon the field of endeavor of the invention of the present application. Applicants do not agree that all of the prior art, and specifically the Watanabe publication, are combinable and will lead to the claimed invention. The Examiner believes that all of the cited prior art is in the “art of acoustics”, and therefore includes the appropriate motivation. As discussed above, this is not the case. First, the “acoustics art” is overly broad and does not describe any particular “field of endeavor”. As in *In re Oetiker*, the court overturned a finding that all “hooking problems” are analogous. Similarly, under the present factual scenario, Applicants respectfully submit that the art of “acoustics” is overly broad, and the Watanabe publication (and its teachings) do, indeed, represent non-analogous art and are not within the field of Applicants’ endeavor.

The systems and structures of the Watanabe publication are directed to sound absorbing materials, while the systems and structures of the present invention are directed to sound generating materials. These different fields of endeavor result in very different structures having different properties, components, construction, dimensions and results. On this basis, Applicants assert that there is no motivation to combine the teachings of the Watanabe publication with the teachings of the Ward patent in order to arrive at the presently claimed loudspeaker diaphragm. In addition, Applicants assert that the Watanabe publication represents non-analogous art, and cannot be properly combined with the remaining references to arrive at the presently-claimed invention.

Summary

For the foregoing reasons, independent claim 1 is not rendered obvious over the Ward patent, the Watanabe publication or any of the prior art of record, whether used alone or in combination. There is no hint or suggestion in any of the references cited by the Examiner to combine these references in a manner which would render the invention, as

Response Under 37 CFR 1.116

Expedited Procedure

Examining Group 2800

Application No. 10/730,162

Response dated October 2, 2006

Reply to Final Office Action of August 17, 2006

Attorney Docket No. 4444-032065

claimed, obvious. Reconsideration of the rejection of independent claim 1 is respectfully requested.

Claims 2-13 and 20 depend either directly or indirectly from and add further limitations to independent claim 1 and are believed to be allowable for the reasons discussed hereinabove in connection with independent claim 1. Further, many of these claims have been rejected over a number of prior art references used in combination, and Applicants again submit that such a combination could not be arrived at without the improper use of the Watanabe publication. Therefore, for all the above reasons, reconsideration of the rejections of claims 2-13 and 20 is respectfully requested.

Independent claim 14 is not rendered obvious over the Ward patent, the Watanabe publication or any of the prior art of record, whether used alone or in combination. There is no hint or suggestion in any of the references cited by the Examiner to combine these references in a manner which would render the invention, as claimed, obvious. Reconsideration of the rejection of independent claim 14 is respectfully requested.

For the foregoing reasons, independent claim 15 is not rendered obvious over the Ward patent, the Watanabe publication, the Kanada publication or any of the prior art of record, whether used alone or in combination. There is no hint or suggestion in any of the references cited by the Examiner to combine these references in a manner which would render the invention, as claimed, obvious. Reconsideration of the rejection of independent claim 15 is respectfully requested.

Claim 16 depends directly from and adds further limitations to independent claim 15 and is believed to be allowable for the reasons discussed hereinabove in connection with independent claim 15. Therefore, reconsideration of the rejection of dependent claim 16 is respectfully requested.

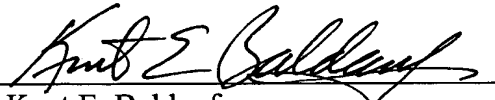
For the above reasons, independent claim 17 is not rendered obvious over the Ward patent, the Watanabe publication, the Kanada publication, the Yamiji patent or any of the prior art of record, whether used alone or in combination. There is no hint or suggestion in any of the references cited by the Examiner to combine these references in a manner which would render the invention, as claimed, obvious. Reconsideration of the rejection of independent claim 17 is respectfully requested. Claims 18 and 19 depend either directly or

Response Under 37 CFR 1.116
Expedited Procedure
Examining Group 2800
Application. No. 10/730,162
Response dated October 2, 2006
Reply to Final Office Action of August 17, 2006
Attorney Docket No. 4444-032065

indirectly from and add further limitations to independent claim 17 and are believed to be allowable for the reasons discussed hereinabove in connection with independent claim 17. Therefore, reconsideration of the rejections of claims 18 and 19 is respectfully requested.

For all the foregoing reasons, Applicants believe that claims 1-20 are patentable over the cited prior art and in condition for allowance. Reconsideration of the rejections and allowance of all pending claims 1-20 are respectfully requested.

Respectfully submitted,
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